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Iridium double perovskite Sr2YIrO6: A combined structural and specific heat study

Corredor L., Aslan-Cansever G., Sturza M., Manna K., Maljuk A., Gass S., Dey T., Wolter A., Kataeva O., Zimmermann A., Geyer M., Blum C., Wurmehl S., Büchner B.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017 American Physical Society. Recently, the iridate double perovskite Sr2YIrO6 has attracted considerable attention due to the report of unexpected magnetism in this Ir5+ (5d4) material, in which according to the Jeff model, a nonmagnetic ground state is expected. However, in recent works on polycrystalline samples of the series Ba2-xSrxYIrO6 no indication of magnetic transitions have been found. We present a structural, magnetic, and thermodynamic characterization of Sr2YIrO6 single crystals, with emphasis on the temperature and magnetic field dependence of the specific heat. As determined by x-ray diffraction, the Sr2YIrO6 single crystals have a cubic structure, with space group Fm3m. In agreement with the expected nonmagnetic ground state of Ir5+ (5d4) in Sr2YIrO6, no magnetic transition is observed down to 430 mK. Moreover, our results suggest that the low-temperature anomaly observed in the specific heat is not related to the onset of long-range magnetic order. Instead, it is identified as a Schottky anomaly caused by paramagnetic impurities present in the sample, of the order of n~0.5(2)%. These impurities lead to non-negligible spin correlations, which nonetheless, are not associated with long-range magnetic ordering.

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